

# Adequate management for various problems of geriatric syndrome in elder diabetic patients

## Abstract

Diabetes in elderly patients has frequent occurrence of geriatric syndrome. It includes a variety of problems among which the following can be cited, dementia, flailty, sarcopenia, impaired ADL / QOL, falls, malnutrition, depression, urinary incontinence, multiple medications, and so on. Risk ratio of total dementia is 1.51. Elderly patients with diabetes have sarcopenia 2-3 times more frequently than that of non-diabetic patients. In elderly patients with diabetes, sarcopenia obesity, low carbohydrate diet (LCD) can become an option for adequate nutritional treatment. American College of Physicians (ACP) presented a Guidance Statement Update in 2018, associated with the recommendation of weaker strict control. ACP guidance was summarized by evaluating four mega diabetic studies, including ACCORD, ADVANCE, UKPDS33/34 and VADT. When managing elderly patients with diabetes, comprehensive evaluation of various factors would be important for the happiness of the patient.

**Keywords:** geriatric syndrome, sarcopenia, dementia, low carbohydrate diet, Japan low carbohydrate diet promotion association

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**Abbreviations:** LCD, low carbohydrate diet; JLCDPA, Japan low carbohydrate diet promotion association; ACP, American college of physicians; PEM, protein energy malnutrition; MACE, major adverse cardiovascular events; ESPEN, European society for clinical nutrition and metabolism

## Commentary

In recent years, the population of the elderly people has increased across the world. Thus, ageing population has been recently highlighted for the importance of medical care. Specifically, it is necessary to evaluate not only physical function, but also psychological/ mental/ cognitive function. Furthermore, appropriate diet and exercise therapy has to be given according to each medical and health situation. In this article, various problems related to the elderly patients with diabetes will be discussed.

The most important feature in elderly patients with diabetes has been the frequent occurrence of geriatric syndrome.<sup>1</sup> This is comprised of a variety of problems including dementia, flailty, sarcopenia, impaired ADL /QOL, falls, malnutrition, depression, urinary incontinence, multiple medications, and so on.

In particular, diabetes has a high risk of causing Alzheimer's disease, vascular dementia, total dementia and mild cognitive impairment (MCI).<sup>2</sup> The result of risk ratio for each state is 1.46, 2.49, 1.51 and 1.22, respectively.<sup>2</sup> Among these, self-care disorders have been observed because their memory and executive functions have been impaired. Therefore, it is important to evaluate cognitive function for elderly patients with diabetes. However, the screening is not so easy procedure in the actual clinical setting.

Furthermore, sarcopenia and flail have been crucial problems related to body function. Sarcopenia has been found in 15% of diabetic patients, which shows 2-3 times more frequent presence than that in non-diabetic patients.<sup>3</sup> Diabetes shows several impaired

or decreased physical functions, such as walking speed, lower limb muscle strength and muscle quality.<sup>4-7</sup> Consequently, diabetes seems to be characteristic of generally decreased muscle function.<sup>5,6</sup>

In 2018, the European Working Group on Sarcopenia in Older People (EWGSOP) announced a new diagnostic standard guideline (EWGSOP 2).<sup>8</sup> It evaluates muscle weakness with emphasis on grip strength or required time to get up from a chair. In fact, there was an increased risk of death and cardiovascular mortality in diabetic patients with reduced grip strength.<sup>8</sup> Muscular strength would be emphasized rather than muscle volume for the evaluation of sarcopenia in the future.

As to the therapy for sarcopenia and flail, adequate nutrition intake has been deemed necessary. The European Society for Clinical Nutrition and Metabolism (ESPEN) proposed the standard nutritional recommendations for several situations.<sup>9</sup> They suggest that i) healthy older people take at least 1.0-1.2 g protein/kg body weight/day, ii) older people with malnutrition are given 1.2-1.5 g protein/kg body weight/day, and iii) all of the elderly should have daily physical activity or exercise (resistance training, aerobic exercise) for as long as possible.<sup>9</sup>

In general, the characteristic of malnutrition in the elderly is protein energy malnutrition (PEM).<sup>10</sup> In the case of patients with elderly patients with diabetes and/or sarcopenia obesity, increased energy intake leads to increased carbohydrate intake. Therefore, there would be the risk of unstable glucose variability, weight control deterioration and decreased ADL/QOL states. Consequently, an approach to reduce energy and increase protein intake seems to be necessary for the actual situation.

From the above, low carbohydrate diet (LCD) could be one of the recommended methods for treating such patients. The authors have continued clinical practice and research of LCD for years, and have shown the efficacy of LCD rather than calorie restriction (CR).<sup>11</sup>

We have introduced three types of actual LCD methods, which are super LCD, standard LCD and petite LCD with 12%, 26%, 40% of carbohydrate involvement, respectively.<sup>12,13</sup> Furthermore, we have developed medical and social movement for LCD through various activity of the Japan Low Carbohydrate Diet Promotion Association (JLCDPA).

Concerning exercise therapy for diabetics, resistance exercise and multicomponent exercise are important. In particular, multicomponent exercise intervention could reverse frailty and improve cognition, emotional, and social networking in the community-dwelling elderly frail people.<sup>14</sup> Moreover, there was a study of the Lifestyle Interventions and Independence for Elders (LIFE) trial which was set up as a randomized controlled clinical trial. As a result, elderly patients with diabetes improved both the physical ability and the cognitive function.<sup>15</sup> The crucial point seems to be how to incorporate multi-element movements.

As regards to the diabetic control by the biomarker of hemoglobin A1c (HbA1c) indicating of the amount of blood glucose attached to haemoglobin, American Diabetes Association (ADA) had recommended lower HbA1c value for better diabetic control for long period. On the other hand, American College of Physicians (ACP) presented a Guidance Statement Update in 2018, associated with the recommendation of weaker strict control.<sup>16</sup> The review was conducted from 6 main mega studies. Their recommended targets of HbA1c in 6 studies are summarized as follows: i) AACE/ACE: < 6.5% if safe situation, ii) ADA: <7.0% generally, but < 6.5% or 8.0% possible in various cases, iii) ICSI: < 8.0% and < 7.0% is too strict, iv) NICE: < 6.5% without meds, < 7.0% with 1 med, <7.5% with more than 2 meds, v) SIGN: < 7.0% with individualization, vi) Va/DoD: < 7.0% without complications, 7.0-8.5% with complications, 8.0-9.0% in severe prognosis.

The ACP guidance was summarized by evaluating four megadiabetic studies.<sup>16</sup> They included ACCORD, ADVANCE, UKPDS33/34 and VADT.<sup>17-21</sup> From these results, maintaining HbA1c value less than 7.0% has not reduced the events for macrovascular complications, death, or severe microvascular complications. On the other hand, intensive therapy has caused severe hypoglycemia, death, weight gain and so on. These were the fundamental data of the evidence for the guidance.

ACP showed the relative lack of the evidence in the range of HbA1c 6.5-7.0%. On the other hand, J-DOIT3 conducted in Japan targets the range of HbA1c 6.5-7.0%.<sup>22</sup> Compared to the conventional therapy group (<6.9%), the intensive therapy group (<6.2%) showed superior evidence. The effect on each endpoint was -58% for cerebrovascular events, -24% for primary endpoints, -32% for nephropathy events, and -14% for retinopathy events (each  $p < 0.01$ ).<sup>22</sup>

Regarding the relationship between glucose level and risk of major adverse cardiovascular events (MACE), there was a significant study.<sup>23</sup> The hazard ratio for MACE and cumulative glycemic exposure of protection of CVD events were investigated. As a result, the duration of the intensification of glycemic control would be crucial factor for protection of CVD events.<sup>23</sup>

Recently, the European Endocrine Society and The Gerontological Society of America jointly published the guidelines for elderly patients with diabetes.<sup>24</sup> Its goal was to provide the guidance to practicing health care providers which benefit diabetic patients associated with attention to avoiding unnecessary adverse effects. Among them, a

lower limit was set when using anti-diabetic agents that easily cause hypoglycemia. This policy would affect the actual treatment situation of elderly patients with diabetes in Europe.<sup>24</sup>

In summary, various symptoms and complications are observed in elderly patients with diabetes. The principle of treatment direction is always the same regardless of the diseased condition. However, it will be important to comprehensively evaluate the age, severity of illness, complication states, previous treatment period, probable effects, and to induce them toward treatments that increase their happiness.

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## Conflicts of interest

The authors declare no conflict of interest.

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